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The Clay Products Industry

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EDITORIAL DEPARTMENT NOTE

The current Official Publication belongs to the series dealing with special industries. While fundamental accounting principles are the same in all industries, the applications of them may vary considerably, due to conditions peculiar to the industry. While no one of the special industries series has so broad an appeal as have those publications dealing with the common basic principles, the membership and interest of the N. A. C. A. is so broad that it seems desirable periodically to issue publications dealing with particular applications. Accordingly this issue points out some of the problems met in accounting for clay products.

The author, Richard C. Turner, was born in Portland, Maine, and received his education in the Portland schools, at Fryeburg Academy in Maine, at Amherst College, in class of 1906, and also at the University of Maine. After finishing college he spent several years in Alaska as superintendent of a mining project. Since 1910 he has been with the Denny-Renton Clay & Coal Company of Seattle, Washington. This company manufactures and sells a general line of clay products, including sewer pipe, face brick, fire brick, roofing tile and architectural terra cotta. Thus, for some fifteen years he has studied the cost problems of the clay business generally. He installed the cost system now in use by the company with which he is connected.

He is a former member of the American Association of Industrial Engineers. For several years he has been a member of the National Association of Cost Accountants and has been active in the affairs of the Seattle Chapter, of which he is a member of the Board of Directors.

THE CLAY PRODUCTS INDUSTRY

How many times each day does the executive ask the question, "What does it cost?" It is my belief that this question is one that is uppermost in the minds of all clay ware manufacturers and one that is usually answered most unsatisfactorily. Why?

I have several suggested answers to this question. 1—I believe the average executive does not know his costs and, not knowing does not believe. 2—I oftentimes think that he does not wish to know, for the knowledge accurately given is oftentimes so far from his usual belief that he is unwilling and afraid to admit its correctness. I have come to these conclusions through over fifteen years' study of clay ware costs, not only of the actual manufacturing costs, direct and indirect but also the cost of distribution—selling—and the cost of administration. These statements are primarily for the executive who doubts his costs and for those who have no definite system of cost keeping.

There are three essentials for every satisfactory cost system:

1. The cost figures must interlock with the general ledger accounts.

2. There must be a proper perpetual inventory of ware in process—unfinished ware—and of finished stock.

3. There must be a complete analysis of sales.

In the discussion of these three essentials let us start at the accounting offices. To have a proper interlocking system of cost of manufacture and of operation, accounts should be opened as follows:

1. Manufacturing expense.
2. Clay mine costs.

These accounts are collective accounts in which are found all the items of the expense of manufacture and of clay mining. The postings to these accounts come from the Journal, Voucher Record and Cash Book. At the end of each month these accounts are cleared by Journal voucher or entry and the total in every case must appear on the cost sheets for manufacture and for mining. By clearing these accounts there is never any question regarding the total figure that goes to make up the manufactured cost and the cost of clay in storage.

Perpetual inventories both of unfinished ware and of ware in the yard, i.e., manufactured stock must be religiously kept. To carry out the interlocking idea there must be two accounts in the ledger for this purpose. The names of these accounts may be, 1—Unfinished Ware and, 2—Manufactured Stock.

At the end of each month a journal entry is made charging the unfinished ware account and crediting manufacturing expense. This clears the manufacturing expense account and sets up in the unfinished ware the actual figures that must appear on the cost sheet. When the ware is drawn from the kilns and sorted, ready for sale or shipment, the unfinished ware is given credit for it and the manufactured stock charged with the amount drawn.

Again the interlock operates in the perpetual inventories. These perpetual inventories necessarily must be kept either on cards or in a loose leaf book prepared for the purpose. The balances appearing in the unfinished ware and manufactured stock accounts are reflected by the dryer, kiln, and yard inventories.

The manufacturing cost figures must contain at least the following items:

1. Clay
2. Labor.
3. Supplies.
4. Fuel.
5. Power.
6. Taxes.
7. Insurance.
8. Depreciation.

I have found that the most simple and satisfactory arrangement of the items appearing on the cost sheet is to list them in two groups as follows:

1. Direct charges.
2. Indirect charges.

Under direct charges will appear the following detailed items:

1. Clay.
2. Making.
   a—Mining clay and dry pans.

b—Grinding and screening.
c—Mixing (wet pan).
d—Machines (Press or otherwise).
e—Finishing and drying.
f—Changing of dies.
g—Cleaning floors, etc.

3. Setting.
4. Burning labor.
5. Burning fuel.
6. Drawing kilns.

Under indirect charges will appear the following details:

7. Repairs—material and labor.
   a—Buildings.
   b—Machinery and equipment.
   c—Kilns.
   d—Miscellaneous—light, water, etc.
8. General Expense—material and labor.
   a—Superintendence.
   b—Watchman.
   c—Miscellaneous general charges.
9. Stable expense (In plants using horses or mules).
10. Taxes.
11. Insurance.
    a—Fire.
    b—Liability.
    c—Industrial.
12. Depreciation.
13. Power Labor.
14. Power Fuel or Electric Power.

This arrangement is flexible and can be readily adapted to any clay organization except those manufacturing architectural terra cotta where a slightly different arrangement of the direct charges is necessary. The indirect charges are much the same for all classes. This will apply to the single unit one plant concern as well as a multiple plant company making many different products at each plant.

Simplicity of cost form is essential to efficient cost keeping. Many systems are pretty to look at and cover minute detail, but are costly in themselves to keep and the final result is not what is desired. The executives want to know the cost of your individual products, without wading through a mass of figures. One glance at your cost sheet should tell the story. The plant superintendents should have absolute knowledge of the detail of your own cost figures, so that you can give intelligent answers explaining the differences that are sure to occur from time to time.

There should be absolute co-operation between the cost department and the plant, and it is directly up to the cost manager to allow no chance for misunderstanding with the plant's heads as

far as the figures on their own cost sheets are concerned. The plant cost sheet should be the plant head's bible, and if he doubts the result shown he cannot govern his actions for cost reduction efficiently, nor can he analyse them correctly.

I submit here a cost sheet form which through many years has stood the test and has proved satisfactory in the clay working industry. See page 164.

This form automatically takes care of dryer and kiln losses, the cost of which is absorbed in the cost of No. 1 finished product.

I wish to call your particular attention to the line "No. 1 finished." This figure is obtained by subtracting the cost of unfinished ware inventory from the "total factory cost" and is divided by the units of No. 1 ware drawn to obtain the current cost of No. 1 ware. The same is true of the cumulative figures which naturally follow in the course of figuring, the current month's result being added to the amounts shown in the previous cumulative columns.

The unfinished ware inventory is figured at the cost of the current month, i.e., units times the amount shown on the current cost sheet. In this system the various divisors of units are as follows:

Making Clay Repairs General Expense Stable Taxes Insurance Depreciation Power Power fuel Electric power	Divide by units made, i.e., all ware actually put through machines.
Setting	Divide by units set.
Ware burned	Divide by units actually completed.
Ware burning	Ware still on fire.
Fuel ware burned	Divide by units actually completed.
Fuel ware burning	Ware still on fire.
Drawing	Divide by total units drawn including No. 1-2 and culls.

I mentioned before the automatic feature of this form in connection with dryer and kiln losses. By figuring the current dryer inventory each month at its own cost you only have value on your cost sheet for what is actually left in the dryer. The same is true for the Kiln inventories, burned, burning, and ware set green and not under fire. One thing that is necessary here is to account for the clay that is returned to the dry pans for the dryer, caused by broken ware and scrap. Credit must be given the clay used by

the amount of dryer loss in tonnage and only clay actually used from storage charged to the manufacturing expense account.

Your kiln inventories give you the reference for what units are still in the kilns, burned, not drawn, burning, still on fire, and ware set green, no fire yet applied.

It is my practice to disregard any product except No. 1 salable ware in the final result. My reasons for this are many, some of which may be stated as follows:

1. Such a practice forces the plant to greater efficiency in producing No. 1 ware from the kilns. The dryer crew must take better care of the ware under their hands, the setter must reject anything that is not perfect and the kiln turners are "put on their toes," knowing that perfect ware is set in the kilns, to see that it comes out in the same way. This automatically charges the whole plant crew from machine to yard with our idea "No. 1 Production Only."

2. If you have no No. 2 ware to sell, you cannot sell it and the customer is educated to a standard which he will soon recognize and expect.

3. You have at all times a more accurate basis for cost comparison.

Figuring the cost on the basis of No. 1 production only is, in my mind, the greatest help to plant efficiency of any method yet devised. This is also reflected in the cost of sales by reduction in costs. One must recognize that No. 2 ware actually costs more than No. 1 because it has to be handled at least once more.

Few executives care to charge the cost of sales of No. 2 ware with the actual cost of this ware as it will always show a loss on sale; accordingly, they have a tendency to set up an arbitrary cost of No. 2 which is wrong in every case and the true story is never told. The sales force also recognizes this fact and the result is that no great effort is made to get rid of second class ware and many yards for this reason are full of No. 2 and cull stock. On the other hand, if the value is shown only on No. 1 ware produced and the cost of sales charged likewise, a true story is told. If you are fortunate enough to sell all your No. 2 ware the ratio of the cost of sales to the sales will be accurate. If you do not sell your No. 2 ware and it is accumulated in your yard, you do not have value tied up in worthless, unsalable, and obsolete stock which you must write off sooner or later in any event. To those plants that are unfortunate enough to be unable to produce a high percentage of No. 1 ware and do not have a ready market for No. 2 quality, it will act as a spur to the sales force to move this No. 2 ware if they know they can do so and not show losses on the Profit and Loss statement. This will, of course, have a tendency to keep the yard clean and up to standard.

The ware is now in the yard ready to sell and the No. 1 ware produced bears the cost of production.

I have come to the conclusion that the actual cost of produc-

	COMBINED				PER UNIT	
	QUANTITY		AMOUNT		$	
	CURRENT MONTH	MONTHS TO DATE	CURRENT MONTH	MONTHS TO DATE	CURRENT	CUMULATIVE
Gross Sales						
Freight						
Cntg. Pkg. & Hdlg.						
Alt. & Rec.						
Lay. Roof Tax						
Total Deductns.						
Net Sales						
Cost of Sales						
Gross Profit						
Trading Expenses						
Trading Profit						
Administration Expense						
Ord. Business Profit						
Net Cost Sales						
Inventory Shrinkage						

tion or manufacture is not of such great importance as to overshadow the cost of selling and the cost of administration. The last two costs are as important in the profit and loss analysis as is the cost of production.

On page 162 is shown a suggested form for a detailed Profit and Loss statement.

It will be noted that the following control or summary accounts are provided in the general ledger:

Cost of Sales.	Cost of Laying Roofing Tile.
Freight.	Sales.
Crating, Packing and Handling.	Trading Cost or Expense.
Allowances and Returns.	Administration Cost or Expense.

This form may be adapted to any size of organization in much the same way as the cost form, and may be adapted to any number of sales yards, as well as sales made direct from the factory, and the whole shown in combination in the last column. By means of this form one is able to have a controlling history of the various products at whatever place they may be sold. The form is also invaluable not only to the executive heads but as well to the sales department.

The "Units" on the Profit and Loss form come from the perpetual inventory record and the values of gross sales come from the detailed sales analysis.

It is unnecessary for me to go into the bookkeeping detail by which the figures in the other accounts are obtained.

I make a practice of distributing the cost of administration in direct proportion to the sales. Each factory and sales yard in the organization is charged with its proportion of the administration expenses and each product in turn bears its proportionate amount.

The trading or selling expense is treated likewise, but in many cases there is a general sales expense exclusive of the individual yard trading costs. This general sales expense is divided against factory direct sales only.

You will notice the line for "Net Cull Sales Accounts" is found in the ledger to accommodate the sales of No. 2 ware or culls but there is no cost of sales charged in the cull sale section.

The line for "Inventory Shrinkage" is in a manner self explanatory. Each physical inventory taken, usually shows some loss of ware from one cause or another, either breakage, resorting from No. 1 to No. 2, theft, or clerical errors at the factory yards. The same is true at the various sales yards and in addition there may be here the factor of faulty loading in transferring from plant to yard. This loss is charged to the plant inventory shrinkage, on the theory that the loading at the plant was not up to standard. Of course, in event of rough handling, the railroad company is made responsible and the amount recovered in this case is found in the claim account in the ledger.

FORM A.

COST STATEMENT

No. 1 FACTORY ——— 19—

PRODUCT:

	QUANTITY		AMOUNT EXPENDED		COST PER		FACTORY INVENTORY		
	CURRENT MONTH	TO DATE	CURRENT MONTH	TO DATE	CURRENT MONTH	CUMULATIVE		UNITS	$
DIRECT CHARGES									
REPAIRS	10011	10011	1,000.00	1,000.00	0.1000	0.1000	DRYER — PREVIOUS INV.	5,000	500.00
CLAY	10011	10011	1,000.00	1,000.00	0.1000	0.1000	CURRENT	5,011	501.10
LABOR	10011	10011	1,000.00	1,000.00	0.1000	0.1000	TO A/C FOR	10,011	1,001.10
MINE EXPENSE	10011	10011	1,000.00	1,000.00	0.1000	0.1000	" INV.	10,011	1,001.10
PURCHASED SUPPLIES	10011	10011	1,000.00	1,000.00	0.1000	0.1000	TO A/C FOR	10,011	1,001.10
PURCHASED FUEL	10011	10011	1,000.00	1,000.00	0.1000	0.1000	ACTUAL INV.	10,011	1,001.10
DRAYAGE	10011	10011	1,000.00	1,000.00	0.1000	0.1000	CURRENT GAIN		
RAW INVENTORY JANUARY 1ST							" LOSS		
TOTAL DIRECT WAGES AND SUPPLIES							CUMULATIVE GAIN		
INDIRECT CHARGES							" LOSS		
REPAIRS	10011	10011	1,000.00	1,000.00	0.1000	0.1000	$ GAIN OR LOSS		
GENERAL EXPENSE	10011	10011	1,000.00	1,000.00	0.1000	0.1000			
STABLE	10011	10011	1,000.00	1,000.00	0.1000	0.1000	MANUFACTURED STOCK		
TAXES	10011	10011	1,000.00	1,000.00	0.1000	0.1000			
FIRE AND LIABILITY INSURANCE	10011	10011	1,000.00	1,000.00	0.1000	0.1000	PREVIOUS DRAWING	1,23,100.21	
DEPRECIATION	10011	10011	1,000.00	1,000.00	0.1000	0.1000	CURRENT "		
POWER	10011	10011	1,000.00	1,000.00	0.1000	0.1000	TOTAL	1,23,100.21	
BOILER FUEL	10011	10011	1,000.00	1,000.00	0.1000	0.1000			
ELECTRIC POWER	10011	10011	1,000.00	1,000.00	0.1000	0.1000	REMARKS		
TOTAL INDIRECT WAGES AND SUPPLIES									
TOTAL FACTORY COST							DRYER INVENTORY		
COST OF FINISHED PRODUCT							KILN INVENTORY BURNED		
NO. 1 FINISHED							KILN INVENTORY UNBURNED		
DEDUCTIONS NO. 1 WARE SPOILED							KILN INVENTORY GREEN		
UNFINISHED WARE INVENTORY							TOTAL UNFINISHED WARE INV.		

By way of summary, let me restate the points I have tried to make:

1. Install an interlocking cost system.
2. Figure the final cost on No. 1 Production Only.
3. Simplify the cost and analytical forms consistently with what the policy of the organization requires.

It is only by so doing that you may trust the cost sheet to tell the true story and in this way be able to govern operations efficiently.

In order to illustrate the working detail of the cost sheet a short explanation of the method of figuring will be given. Refer to the Cost Statement, Form 3, page 164.

The amount expended in the current month is $15,235.84. This is the figure found in the ledger under "Manufacturing Expense." A Journal voucher is made crediting Manufacturing Expense and debiting "Unfinished Ware." The details of this figure appear, of course, under the various operations as shown on the cost sheet.

Under the "Factory Inventory" will be found the detail of the Units handled under the various operations and also the losses and where they occurred.

It is important to note how the value of the unfinished ware inventory is obtained.

Dryer Inventory

Indirect =	$6,248	Total of indirect charges
Clay =	.775	
Making =	2.419	
Total	$9,442 × 765[7] =	$7,229.73

This figure represents the actual value of the ware on the drying floor at the end of the month.

Kiln Inventory Unburned—still on fire

Indirect Charges =	$6.248		
Clay =	.775		
Making =	2.419		
Setting =	1.263		
	$10.705 × 187[1] =		$2,002.91
	Labor at Kilns =		171.80
	Fuel at Kilns =		362.70
			$2,537.41

Kiln Inventory Burned

Total Current Cost.....	$14.831	
Deduct: Drawing Cost...	.676	
	$14.155	× 272³ = $3,854.68

Total of Unfinished Ware

Dryer	$7,229.73
Kiln Inventory:	
Burned	3,854.68
Unburned	2,537.41
	$13,261.82

Had there been a Kiln partly set with green ware the cost would have been as follows:

Indirect Charges	$ 6.248
Clay	.775
Making	2.419
Setting	1.263
Total	$10.705 × Units set in Kiln

Note that the total amount already expended for the year is $100,996.78. The current unfinished wear amount is deducted leaving $87,374.96, which has been "drawn" and charged to manufactured stock. Note also that the "previous drawing" shows $73,682.71 leaving an amount of $13,692.25, which represents the "current drawing." In this figure the losses are automatically absorbed on account of the inventories being figured on the actual amounts in inventory and at current costs. A journal voucher is made crediting "unfinished ware" with $13,692.25 and charging "manufactured stock" with the same amount.

The total units drawn show 925^5.

841^6	No. 1 =	90.93%
72^3	No. 2 =	7.81%
11^6	Loss =	1.26%
925^5		100.00%

I believe that this system gives all the necessary features of a good cost system for any clay works, large or small, single unit or multiple plant. If the Clay Products Industry will base their costs on No. 1 production only, a long step will be taken in the development of standard and uniform cost finding.